

**WHAT IS CLAIMED IS:**

- 1 1. For use with a node of a communications network, a  
2 method for setting up a connection in response to a  
3 request, the method comprising:
  - 4 a) determining a next link of the connection based on  
5 routing information;
  - 6 b) determining whether the determined next link of  
7 the connection has sufficient capacity to meet that  
8 requested by the request;
  - 9 c) if the determined next link of the connection is  
10 determined to not have sufficient capacity to meet  
11 that requested by the request, repeating (b) and (c)  
12 at least once to try an alternative next link;
  - 13 d) if the determined next link of the connection is  
14 determined to have sufficient capacity to meet that  
15 requested by the request, then updating connection  
16 admission control information to decrease the capacity  
17 of the link to reflect the capacity requested by the  
18 request.
- 1 2. The method of claim 1 wherein if the determined next  
2 link of the connection is determined to have sufficient  
3 capacity to meet that requested by the request, then  
4 further requesting a connection identifier.
- 1 3. The method of claim 2 further comprising:
  - 2 e) accepting a requested connection identifier  
3 received; and
  - 4 f) providing an interface number and allocation  
5 control information to an interface associated with  
6 the interface number.

1 4. The method of claim 3 further comprising:

2 g) if an interface receives an interface number and  
3 allocation control information associated with the  
4 interface number, then

5 i) determining a bit-vector corresponding to the  
6 interface number,

7 ii) determining a first available part of the  
8 link, and

9 iii) marking the bit vector such that bits  
10 corresponding to the determined first available  
11 part of the link are marked as unavailable.

1 5. The method of claim 4 wherein the link is a time  
2 division multiplexed link.

1 6. The method of claim 4 wherein the link is a wavelength  
2 division multiplexed link.

1 7. The method of claim 1 further comprising:

2 e) accepting allocated capacity information;

3 f) updating switch mapping information in response to  
4 the received allocated capacity information; and

5 g) updating state information based on the allocated  
6 capacity information.

1 8. The method of claim 3 further comprising:

2 g) accepting allocated capacity information;

3 h) updating switch mapping information in response to  
4 the received allocated capacity information;

5 i) updating state information based on the allocated  
6 capacity information; and

7 h) generating a set up message including the  
8 connection identifier and the interface.

1 9. For use with a node of a communications network, the  
2 node having interfaces terminating communications links, an  
3 apparatus for setting up a connection in response to a  
4 request, the apparatus comprising:

- 5 a) at least one storage device storing  
6 i) routing information;  
7 ii) connection admission control information;  
8 and  
9 b) a programmable device adapted to  
10 i) determine a next link of the connection based  
11 on the routing information;  
12 ii) determine whether the determined next link  
13 of the connection has sufficient capacity to meet  
14 that requested by the request of the call;  
15 iii) repeat (ii) and (ii) at least once to try  
16 an alternative next link if the next link of the  
17 connection is determined to not have sufficient  
18 capacity to meet that requested by the request;  
19 and  
20 iv) update the connection admission control  
21 information to decrease the capacity of the link  
22 to reflect the capacity requested by the request  
23 if the determined next link of the connection is  
24 determined to have sufficient capacity to meet  
25 that requested by the request.

1 10. The apparatus of claim 9 wherein the programmable  
2 device is a field programmable gate array.

1 11. The device of claim 9 wherein the programmable device  
2 is further adapted to request a connection identifier if  
3 the determined next link of the connection is determined to  
4 have sufficient capacity to meet that requested by the  
5 request.

1 12. The device of claim 11 wherein the programmable device  
2 is further adapted to  
3 - accept a requested connection identifier; and  
4 - provide an interface number and allocation control  
5 information to an interface associated with the  
6 interface number.

1 13. The device of claim 12 wherein the programmable device  
2 is further adapted to  
3 - if an interface receives an interface number and  
4 allocation control information associated with the  
5 interface number, then  
6 i) determining a bit-vector corresponding to the  
7 interface number,  
8 ii) determining a first available part of the  
9 link, and  
10 iii) marking the bit vector such that bits  
11 corresponding to the determined first available  
12 part of the link are marked as unavailable.

1 14. The device of claim 13 wherein the link is a time  
2 division multiplexed link.

1 15. The device of claim 13 wherein the link is a  
2 wavelength division multiplexed link.

1 16. The device of claim 9 wherein the programmable device  
2 is further adapted to

- 3 - accepting allocated capacity information;
- 4 - updating switch mapping information in response to
- 5 the received allocated capacity information; and
- 6 - updating state information based on the allocated
- 7 capacity information.

1 17. For use with a node of a communications network, the  
2 node having interfaces terminating communications links,  
3 and being adapted to effect a signaling protocol for  
4 establishing a connection, a machine readable medium having  
5 a machine readable data structure comprising a plurality of  
6 entries, each of the entries including:

- 7 a) a first field for storing an index for indexing
- 8 the entry based on an identifier of a connection used
- 9 locally by the node;
- 10 b) a second field for storing a second identifier of
- 11 the connection used by a node upstream of the node in
- 12 the connection;
- 13 c) a third field for storing a third identifier of
- 14 the connection used by a node downstream of the node
- 15 in the connection;
- 16 d) a fourth field for storing a state of the
- 17 connection; and
- 18 e) a fifth field for storing a characteristic of the
- 19 connection.

1 18. The machine readable medium of claim 17 wherein the  
2 state of the connection is selected from a groups of states

3 consisting of (A) closed, (B) setup sent, (C) established,  
4 and (D) release sent.

1 19. The machine readable medium of claim 17 wherein the  
2 characteristic of the connection stored in the fifth field  
3 is a bandwidth value required by the connection.

1 20. For use in call signaling protocol, a method for use  
2 by a node of a communications network to determine a link  
3 of a connection, the method comprising:

- 4 a) determining a next hop of the connection based on  
5 routing information;  
6 b) determining a link associated with the determined  
7 next hop;  
8 c) determining whether or not the determined link has  
9 sufficient communications resources to satisfy the  
10 call; and  
11 d) only if it is determined that the determined link  
12 has sufficient communication resources to satisfy the  
13 call, then allocating communication resources of the  
14 link to the call.

1 21. The method of claim 20 wherein the communications  
2 resources is bandwidth.

1 22. The method of claim 20 wherein the link is a  
2 multiplexed link having channels, and  
3 wherein the act of allocating communication resources  
4 of the link to the call includes determining available  
5 channels of the link until the sum of capacity of the  
6 determined available channels is enough to satisfy the  
7 call.

1 23. The method of claim 22 wherein the link is a time  
2 division multiplexed link and wherein the channels are  
3 time-slots.

1 24. The method of claim 22 wherein the link is a  
2 wavelength division multiplexed link and wherein the  
3 channels are wavelengths.

1 25. For use in call signaling protocol, an apparatus for  
2 use by a node of a communications network adapted to  
3 determine a link of a connection, the apparatus comprising:  
4 a) means for determining a next hop of the connection  
5 based on routing information;  
6 b) means for determining a link associated with the  
7 determined next hop;  
8 c) means for determining whether or not the  
9 determined link has sufficient communications  
10 resources to satisfy the call; and  
11 d) means for allocating communication resources of  
12 the link to the call only if it is determined that the  
13 determined link has sufficient communication resources  
14 to satisfy the call.

1 26. The apparatus of claim 25 wherein the communications  
2 resources is bandwidth.

1 27. The apparatus of claim 25 wherein the link is a  
2 multiplexed link having channels, and  
3 wherein the means for allocating communication  
4 resources of the link to the call includes means for  
5 determining available channels of the link until the sum of

6 capacity of the determined available channels is enough to  
7 satisfy the call.

1 28. The apparatus of claim 27 wherein the link is a time  
2 division multiplexed link and wherein the channels are  
3 time-slots.

1 29. The apparatus of claim 27 wherein the link is a  
2 wavelength division multiplexed link and wherein the  
3 channels are wavelengths.